It appears, therefore, that the water pans supplied little more than one-seventh as much water as was needed for proper humidification, if the standard set of 70° F. and 70 per cent humidity be a proper one.

Knowing the quantity of air supplied per minute by a heating plant, it is a simple matter to estimate the amount of water that should be evaporated and added to air of given outside temperatures and humidities.

Clearly we are best off in winter in this respect when the outside air is saturated. Suppose an outdoor temperature of 40°. At saturation there are present 2.85 grains of water to the cubic foot. If a heater raises this air to 70° without adding to its water content, it will become drier as failing to increase its water along with its temperature. In other words, to maintain saturation at 70° F. needs 7.98 grains of water to the cubic foot, and having still but 2.85 it is said to have only 2.85÷7.98, or 36 per cent [of the amount of] water [needed] to saturate it. Its relative humidity, therefore, is 36 per cent. For the 70 per cent humidity assumed as a desirable standard, we need 0.70×7.98 = 5.59 grains of water. The heating apparatus should therefore add 2.74 grains of water at the same time as it raises the temperature in order to produce the desired humidity. This additional 2.74 grains is a minimum quantity, however, since we have assumed the favorable case of saturated outer air. Had the outer air contained the average 69 per cent of Professor Ward's table, the water vapor present would have been only 0.69×2.85 or 1.97 grains per cubic foot and the additional water needed to obtain the desired humidity would be 3.62 grains. Table A gives the relative humidities that would result from raising to 70° F. without adding water, outer air at various temperatures, from 0° to 50° and relative humidities from 60 to 100 per cent.

TABLE A.—*Showing inside humidities corresponding to certain outside humidity.*

Outside humidity.	60 per cent.	80 per cent.	100 per cent.
Outside temperatures. °F.	Inside humidity.		(Per cent.)
0	4	5	6
10	6	8	10
20	9	12	16
30	14	19	24
40	21	29	36
50	31	41	51

The number of grains that should be added in each case to bring the humidity up to 70 per cent when air has been raised to 70° is given in similar form in Table B.

TABLE B.—*Amount of water required to bring inside humidity to 70 per cent when the temperature is raised to 70°F.*

Outside humidity.	60 per cent.	80 per cent.	100 per cent.
Outside temperatures. °F.	Grains of water.	(Cubic foot.)	
0	5.30	5.21	5.11
10	5.12	4.97	4.81
20	4.85	4.60	4.35
30	4.43	4.04	3.65
40	3.88	3.31	2.74
50	3.14	2.33	1.51

This table is a somewhat precise expression of the fact that the drier and colder the air outside, the more intense and unwholesome the indoor aridity that results from heating air without humidifying it, and the greater the demand on any humidifying arrangement for water to compensate the effect of raised temperature. According to Chamber's Encyclopedia, "Ventilation" requires a supply of 20 to 30 cubic feet of air per minute per individual. Let us say 25 cubic feet per minute or 36,000 per day of twenty-four hours. To find the daily need of water corresponding to that air supply per individual, we multiply the grains per cubic foot of Table B by 36,000, and divide by 14,600, the number of grains to a quart, giving us

Table C with quarts of water per day per individual needed to correct the aridity of air that has been raised to 70° from the outside conditions tabulated.

TABLE C.—*Daily amount of water, per individual, required to correct the aridity of air raised to 70°F.*

Outside humidity.	60 per cent.	80 per cent.	100 per cent.
Outside temperatures. °F.	Quarts per day.		
0	13.7	12.8	12.6
10	12.6	12.2	11.9
20	12.0	11.3	10.7
30	10.9	10.0	9.0
40	9.6	8.2	6.8
50	7.7	5.8	3.7

From Table C it appears that under the average conditions of Professor Ward's twenty-one days, about 2 gallons of water per individual should be evaporated to humidify his daily supply of air. A family of 5 persons would need 10 gallons of water evaporated daily for the same purpose, and a schoolhouse 200 gallons of water daily per 100 pupils. If the air supply assumed at 25 cubic feet per minute be not an actual quantity, it is simple to assign the proper proportionate value for any known rate of air supply. We might cut down a school supply by reducing the hours allowed for daily use from 24 to 9, corresponding to a drop from 200 gallons per 100 pupils to 75 gallons daily. On the other hand, Professor Ward's instructive observations were far from approaching the extremes met any winter in American houses, as his coldest outside temperature mentioned is 23° and least outside humidity 51 per cent. From Table A we learn that zero temperatures with a humidity of 60 per cent means an inside humidity of 4 per cent if the air is raised to 70°F. without additional water. Even adding the maximum amount supplied by Professor Ward's water pans in any day (November 11), 1.18 grains, we yet have a relative humidity of only 18.4 per cent. If it is true that a cold spell makes it hard to keep up to 70°, it is also true that we suffer in the defect of temperature, and also the outer air may commonly have a humidity far below 60 per cent. W. M. Davis says (Meteorology, p. 145) we may have as low as 30 per cent in our winters. Ultra-desert conditions undoubtedly occur within doors every winter.

HONESTY THE BEST POLICY.

In his address on earthquake forecasts[1] before the American Association of Geographers at Baltimore, January 1, 1909, Dr. G. K. Gilbert touches on a question that has been discust before in these columns, viz, the disadvantages in connection with the attempted concealment of dangers from natural phenomena. His remarks apply equally well to meteorological as to earthquake phenomena.

The proposition that it should be the policy of the inhabitants of an earthquake district to recognize the danger and make provision for it appears self-evident, but I regret to say that its soundness is not universally recognized in California.

*   *   *   *   *   *   *

This policy of assumed indifference, which is probably not shared by any other earthquake district in the world, has continued to the present time and is accompanied by a policy of concealment. It is feared that if the ground of California has a reputation for instability, the flow of immigration will be checked, capital will go elsewhere, and business activity will be impaired. Under the influence of this fear, a scientific report on the earthquake of 1868 was suppressed. When the organization of the Seismological Society was under consideration, there were business men who discouraged the idea, because it would give undesirable publicity to the subject of earthquakes. Pains are taken to speak of the disaster of 1906 as a conflagration, and so far as possible the fact is ignored that the conflagration was caused, and its extinguishment prevented, by injuries due to the earthquake. During the period of aftershocks, it was the common practise of the San Francisco dailies to publish telegraphic accounts of small tremors perceived in the eastern part of the United States, but omit mention of stronger shocks in the city

[1] See Science, 1909, 29 (N. S.): 135-6.

itself; and I was soberly informed by a resident of the city that the greater number of the shocks at that time were occasioned by explosions of dynamite in the neighborhood. The desire to ignore the earthquake danger has not altogether prevented the legitimate influence of the catastrophe on building regulations and building practises, but there can be little question that it has encouraged unwise construction, not only in San Francisco but in other parts of the malloseismic district.

The policy of concealment is vain, because it does not conceal. It reflects a standard of commercial morality which is being rapidly superseded, for the successful salesman to-day is he who represents his goods fairly and frankly. It is unprofitable, because it interferes with measures of protection against a danger which is real and important.

IS THIS ONE NATURAL METHOD OF MAKING SNOW ?

Mr. W. W. Neifert, Local Forecaster at Hartford, Conn., recently sent the Editor the following clipping from the New England Palladium for February 6, 1810.

Springfield, Mass.
January 15, 1810.

A very singular appearance was exhibited in this town on Friday last. The Thermometer standing at 0, and two degrees above, with the wind very high at North West. The river furnished an appearance of a heavy fog passing rapidly down it. On an appearance so extraordinary examination was made, and it was found that the wind took the small particles of water and carried them up into the atmosphere, where they immediately congealed into fine snow; they arose some as much as 40 feet above the surface of the water. Its commencement was about meridian, and continued through the day, but most conspicuous at 2 P. M. Several very aged people living in this vicinity do not remember ever seeing the like appearance.

WEATHER BUREAU MEN AS EDUCATORS.

J. W. Bauer, Section Director, Columbia, S. C., reports that the faculty and trustees of the University of South Carolina have just added an elective course in "Elementary and Practical Meteorology" to the curriculum of that institution. The course will begin about February 16, and will consist of 15 weekly lectures by the official in charge of the local office. Waldo's Elementary Meteorology will be used as a text. The class is expected to number about 15 students.

M. E. Blystone, Local Forecaster, Providence, R. I., reports that on January 4 he address the Men's Club of the Congregational Church, Seekonk, Mass., on "Weather Forecasts;" repeated this address on the 28th before the Men's Club of St. James Episcopal Church, Providence.

W. D. Fuller, Observer, reports that classes from the Pasadena and South Pasadena High Schools visited the Los Angeles, Cal., office on February 17 and 18; and from Throop Polytechnic Institute on the 23d. These classes visit the office regularly every year.

Eric R. Miller, Local Forecaster, Madison, Wis., reports that on February 28 he began a course in climatology at the University of Wisconsin. The class meets three times weekly for lectures, recitations, and practical exercises, using Hann-Ward's Climatology as a text. The enrolment is 1 student from the School of Agriculture, 2 from Engineering, 3 from Letters and Science, and 6 from Commerce.

E. H. Nimmo, Observer, Sandusky, Ohio, reports that a class from the Sandusky High School visited the local office on February 18, 1909.

G. H. Noyes, Local Forecaster, Lexington, Ky., address the Men's Club of the Second Presbyterian Church of that city on February 1, 1909. His subject was "The daily workings of the Weather Bureau."

H. W. Richardson, Local Forecaster, Duluth, Minn., reports that on February 10 he gave an illustrated talk before the Park Point Improvement Club on "The Weather Bureau."

J. Warren Smith, Section Director, Columbus, Ohio, reports that classes from the Central High School visited the local office on February 10 and 11.

Wilford M. Wilson, Section Director, Ithaca, N. Y., reports that during February he gave illustrated lectures on topics pertaining to the work of the Weather Bureau before the Cornell Agricultural Association, the Political Study Club, Short Course Students' Association, Forest City Grange, Town and Gown Club, Ithaca Business Men's Association; also two lectures at the College of Agriculture during Farmers' Week.

M. L. Fuller, Observer, Canton, N. Y., reports that on January 26, he delivered a lecture on "The practical value of the Weather Bureau" before the "Farmers' Week" assemblage at Canton, N. Y. After the lecture a considerable portion of the audience visited and inspected the local office in the Carnegie Science Building, St. Lawrence University.

INFLUENCE OF MOUNTAINS AND COASTS ON STORMS.

By D. T. Smith, M. D. Dated Louisville, Ky., March 1, 1909.

In the December number of the Monthly Weather Review the Editor remarks that "It is very desirable that some one should explain in detail the mechanism by which a given range of mountains or the coast of a continent deflects the path of a hurricane center. The east-west ranges in the West Indian Islands and the northeast-southwest Appalachian Range appear to have appreciable influence on some storms, but not on others."

For more than twenty years the writer has been trying to attain the result suggested by the development of a theory that has grown with the development of facts.

The Monthly Weather Review of June, 1906, 34:280, published this theory of mine which is that cyclones and hurricanes, which seem to be nothing else than cyclones moving under the more favorable conditions of tropical seas, derive their movement of translation from the necessity of the coincidence of their center of gravity and their axis of rotation.

At the request of Dr. Hugh Robert Mill, editor of Symons's Meteorological Magazine, this theory was set forth more elaborately in the issue of that journal for May, 1908.

The contention is that the upper constant currents blowing toward the west, in the Tropics, then circling around to become the constant westerlies of the temperate and polar regions, are continually beheading the cyclone, thereby creating a partial vacuum, and that the pressure of the surrounding air into this is the chief source of all cyclonic energy.

The cyclone measurably yields to these currents and leans over in the direction of their motion. The air rushing in from all sides fills up the space in front under the leaning body faster than the rear can be added to, and this shifts the center of gravity forward. Since the mass of the cyclone or hurricane is rotating, the axis must move forward continuously to correspond with the center of gravity, and thus the cyclone is kept constantly advancing. If a mountain chain lies across the cyclone path it will prevent the increase of diameter in front, and thus hold the center of gravity and axis, for a time, stationary. Or it may happen that the mountain chain will hold back the inrush of air in front until that already present is sucked up into the cyclone, thus moving back the center of gravity, and as a result the center of the cyclone will actually recede for a time and has been known to do so.

After a time the cyclone begins to be added to in front above the level of the mountains. This moves the center of gravity forward and the cyclone proceeds to cross the range.

A mountain range running in the direction of travel of a cyclone would deflect the path of a cyclone away from itself in proportion as the diameter of the cyclone's base was interfered with.

If the level of outflow in a cyclone should happen to be unusually high, it would not need to halt at an ordinary mountain chain, and it would be less affected by such a chain parallel with its path.

Continents affect cyclones variously, or rather the frictional resistance of continents must meet a variety of conditions. Tropical cyclones (and I much doubt if there are any other